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ABSTRACT

This guide addresses issues concerned with the reintegration of students with traumatic brain injuries (TBI) into the classroom. It first provides a definition of TBI and identifies characteristics of students with TBI. The guide then discusses cognitive consequences of TBI, with emphasis on deficits of executive function, attention, and memory. Seven guidelines for classroom management of students with executive function deficits follow. A common timetable for regaining attentional skills is offered and goes from "ability to focus attention at all" through "ability to sustain attention" and finally "ability to divide attention." The variety of disturbances of memory processes is discussed as is the relationship between metamemory and working memory. One section provides specific recommendations for school re-entry such as establishment of a school team and avoidance of certain words and phrases in describing the TBI child. The role of the school psychologist in assessment of TBI children is addressed, and specific tests and subtests are recommended. Guidelines are offered for managing behavior problems (such as agitated behavior and inappropriate sexual behavior), cognitive disturbances, and problems of attention and control. The final section considers the use of compensatory systems and accommodative techniques to manage organizational and memory deficits. Contains 29 references. (DB)

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TRAUMATIC BRAIN INJURY: WHEN CHILDREN RETURN TO SCHOOL

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Introduction

Not too many years ago, the term "brain damage" evoked images of children in wheelchairs, unable to speak or to function without considerable help from others. Such a child might have been considered minimally educable, or, if not, educated with enormous effort in highly specialized self-contained classroom settings. The predicted outcomes for such children was always guarded. At best, they might be expected to learn to use adaptive equipment to achieve some level of supported independence. Happily, today this is not the case.

Over the past decade, we have come to recognize that children who have sustained traumatic brain injury (TBI) demonstrate deficits over a broad continuum, ranging from very mild to very severe, with the majority of children demonstrating few or none of the physical impairments described above.

The fact that few children demonstrate severe physical impairments following hospitalization for head injury leads many to believe that recovery has occurred. This notion is understandable, but most often incorrect. What has occurred is physical recovery. That is, the parts of the child's brain which control muscle tone and motor activity have regained sufficient function to allow postural control and normal movement of the major muscles needed for standing, balance, and walking. Many fine motor functions may also show early recovery. These include speech motor skills necessary for clear articulation, and fine motor skills of the hand necessary for grasping, picking up, and manipulating small objects.

In spite of these apparent signs of return to normal, most children continue to demonstrate difficulties with changes in information processing efficiency and with judgment and problem-solving. Many children will also demonstrate behavioral changes which make them seem quite different to family members and friends. When they return to school or enter school for the first time, children who have apparently recovered usually find themselves confronted by far more frustration than before their injury. This often results in increased stress which takes its toll in terms of behavioral changes. Such children may try to avoid work which they find frustrating. They may become non-compliant. At home, they tend to become more irritable (quicker to anger, or crying more readily). Tantrum behavior may increase in

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younger children or return in children who had long before grown out of tantrum displays. Such behaviors, in the absence of visible physical residual problems may be misinterpreted as spoiled behaviors by parents and teachers of younger children, or as emotional problems in older children and adolescents.

A Few Characteristics of Children Who Have Been Head Injured

People who are involved in the education of children should be aware that there are a number of characteristics peculiar to the population of children who have sustained head injury:

> Most children who have sustained traumatic brain injury as a result of a head injury will regain sufficient physical function to walk independently, if not before they are discharged from the hospital, then within the first six to twelve months. A majority of these children will not show obvious physical impairment.
>
> A majority of children who have sustained traumatic brain injury will have residual cognitive impairments, regardless of their physical appearance.
>
> Behavioral changes associated with cognitive deficits are the rule, rather than the exception.

These characteristics have prompted special Federal and State classifications (**Federal Register**, Vol. 57, No. 189, 1992, paragraph 12; **WAC** 392-171-454) which are virtually identical:

> **"Traumatic brain injury" means an acquired injury to the brain caused by an external physical force, resulting in total or partial functional disability or psychosocial impairment, or both, that adversely affects a child's educational performance. The term applies to open or closed head injuries resulting in impairment s in one or more areas, such as cognition; language; memory; attention; reasoning; abstract thinking; judgement; problem-solving; sensory, perceptual and motor abilities; psychosocial behavior; physical functions; information processing; and speech. The term does not apply to brain injuries that are congenital or degenerative, or brain injuries induced by birth trauma.**

What Educators Need to Know

There are a number of things that school psychologists, teachers, therapists, and others who provide direct educational

services to children need to keep in mind.

1. Traumatic brain injury is a term which describes an event; it does not describe a condition. For this reason, the educational needs of the TBI population will vary considerably.

2. The brain has its own nature. Brain injury, though it may disturb function follows the laws of the brain's nature. Brain injury recovery, like brain development, has its own timetable. The rate and the degree of recovery may only be influenced by our interventions, they are not dependent upon our interventions.

3. The complex and manifold nature of the development of children may be more relentlessly revealed as TBI children progress through educational experiences than it might be in non-injured children. Cognitive and social milestones are often made conspicuous by their failure to develop, or developmental transitions may . extremely difficult, straining the coping skills of families and communities.

4. The educational needs of TBI children **cannot be adequately described by conventional means** (ie, by formal test scores or by standardized procedures designed to estimate intellectual function or levels of academic skills). Test results and academic achievement, while reflecting the functional efficiency of certain cognitive systems, do not necessarily reflect cognitive recovery or the lack thereof.

5. Schools have the resources to facilitate the cognitive recovery of TBI children. To do so most effectively, educators need to view themselves as a part of a specialized head injury team. Part of the responsibility of the team involves direct educational intervention, but a larger responsibility lies in intimate networking with other team members. Most teachers have the essential skills to provide TBI children with appropriate educational experiences, once a child's needs have been clarified.

6. The term "recovery" is a relative one. It is more appropriately associated with function than with structural repair. Recovery usually refers to a child's success in adjusting to physical, cognitive, and social-emotional changes after physical healing has taken place. Poor recovery may be seen in the face of apparent complete return of physical function. Conversely, good recovery may be seen in children who demonstrate obvious physical limitations. Recovery from head injury may be a long, in some cases life-long process. It is almost never an easy one, nor is it without disappointments.

COGNITIVE CONSEQUENCES OF TRAUMATIC BRAIN INJURY

Disorganization/Dis-integration of cognitive systems (Thinking with a limp)

The brain's major function is to gather and organize information, generate certain/probable/possible hypotheses about the meaning of information, and generate activities appropriate to those hypotheses. Loss of balance in cognitive systems may result in impaired information processing (omitted information, inadequate production), confusion over the causes of difficulties, and emotional/behavioral response to frustration (anger, avoidance).

TBI disrupts the balance of the cognitive process--requiring an unnatural return to a step-by-step processing, often without the individual fully recognizing that there have been changes in abilities. There may be a number of possible reasons for the child's lack of recognition of deficits or the sources of frustration:

limited opportunity to be confronted by changes in skills
limited environmental demands (hospital, school, home)
limited information about TBI
memory of preinjury abilities
limited new learning or new learning opportunities
refusal to acknowledge changes in abilities (denial)

COGNITIVE DEFICITS FOLLOWING TRAUMATIC BRAIN INJURY

Traumatic brain injury may result in gross structural damage to brain tissue, or it may result in slight damage which is not detectable by current technology (CT scan, MRI, EEG tracings). More sensitive, are changes in functional skills and behavioral changes which interfere with efficient information processing. These changes may manifest in impairments of language, visuospatial processing, or fine-motor coordination and speed. There are an increasing number of excellent texts dealing with modality-specific impairments (see **Recommended Reading** below). In addition, many school-based therapists have had specialized training in hospitals or out-patient clinics, making members of the school re-integration team primary resources for assessment and modality-specific classroom recommendations.

Three areas of function which are frequently disrupted after brain trauma are the **executive function processes**, **attention**, and **memory**. These cognitive processes are essential to a child's ability to benefit from educational opportunities. Moreover, assessment of these functions is problematic; they frequently elude adequate description by standardized test batteries (Mateer & Williams, 1991). The descriptions which follow characterize the

nature and importance of each.

Executive Function Disturbances Following TBI

The executive function processes probably best illustrate the idea that the healthy brain is made up of multiple functional systems which work more or less harmoniously as an integrated whole. Discrete functions such as memory, language, and attention may be discussed on a conceptual level, but in the back of our mind we need to remember that division of brain function into such components is quite artificial. We do it for convenience, or to help us make sense of our observations of behavior. However, brain function pathologies never really exist in isolation. They always exist in terms of relative deficits. In addition, cognitive deficits may be a reflection of situational demands or of the conceptual perspective from which we view them. Even certain cognitive functions which have a long history and which are believed to have reality may simply be artifacts of our traditional points of view.

Executive function and executive function processes are primarily associated with frontal lobe activity. The frontal lobes have been found to play a decisive role in relation to the rest of the brain. These prominent structures seem to regulate attention and the integration of attention, memory, and activities necessary to individual survival. In the words of Donald Stuss and Frank Benson, " When choice, alternatives, control, goal selection, and monitoring are required (when new information must be processed or old information must be processed in new ways), involvement of the frontal lobes is required..." (Stuss & Benson, 1987, p. 153).

Mateer and Williams (1991) view the function of the frontal lobes in terms of three general classifications: self-regulatory abilities, the allocation of attentional resources, and the ability to act on knowledge. The behavioral contributions of frontal lobe function include:

1. The direction of attention. The orientation of the child to specific sensory information; the ability to inhibit disruption by non-salient stimuli.

2. Recognition of patterns of priority. The discrimination of information salience. Recognition of patterns in diverse stimuli. Recognition of personal or experiential meaningfulness. Individuals with frontal lobe injury have extreme difficulty in recognizing hierarchical relationships (main points, controlling ideas) and tend to give equal value to all events. When a hierarch is recognized, the child tends to be unable to see other possibilities, even when conditions change and require rearrangement of the hierarchical order.

3. Formulation of intention. Recognition of potential goals; selection of and decision to obtain a specific goal.

4. Plan for attainment. Analysis of necessary activities. Organization of action sequences. Recognition of available resources, including physical capabilities and availability of materials. Recognition of additional needs, including accommodations necessary for personal limitations. Choice of strategies.

5. Execution of the plan. Initiation of appropriate effort and/or inhibition of inappropriate activities. Maintenance of goal focus. Monitoring of performance, including modulation of activity, assessment of progress, and utilization of feedback necessary to modify strategies and assess the appropriateness of the plan. Maintenance of activity sequences. Maintenance of effort.

6. Recognition of attainment. Recognition of the need to alter the level or nature of activity. Stopping activity. Generation of subsequent plans.

Goal-directed behavior requires that the individual independently and spontaneously direct attention to the salient features of the external environment while attending to situational conditions and internal states which promote success and managing those which might interfere with appropriate patterns of activity.

Frontal lobe/executive function processes are inherent in all purposeful behavior. Behavioral hallmarks include arousal of interest, intentional action, and attainment of reward. Hallmarks of disruption include capture by environmental, internal, or action-generated stimuli, perseveration, failure to initiate appropriate activity, failure to maintain effort over time, failure to recognize and/or to utilize feedback, and failure to independently modulate activity. These difficulties are complicated by lack of appreciation of deficits.

Disorders of the frontal lobe/executive function processes then would be particularly devastating in the case of children who are left with physical and cognitive deficits, since such difficulties require children to learn new ways to compensate adequately for changes in abilities.

While the abilities and subsequent problems described above are specifically associated with function of the frontal lobes, executive function deficits are seen following injury to other brain regions as well. For this reason, behaviors will sometimes be termed "frontal lobe syndrome."

Frontal lobe syndrome is particularly prevalent following traumatic brain injury (Burgess & Wood, 1990). One explanation for

the prevalence of executive function compromise just after a child is injured is that the capacity of working memory becomes overloaded by the multiplicity of deficits (the breakdown of multiple systems through injury) and the consequent need to relearn a number of previously automatic or near automatic functions simultaneously. Under these conditions, exercise of systems until they did not require a high degree of conscious control would be necessary before the capacity of working memory would be returned to near normal (preinjury) conditions.

Classroom Management of Students with Executive Function Deficits

Executive function problems require more understanding and patience on the part of educators than do any other cognitive deficits, and recognition and understanding of problems are essential educational therapies. Students with such difficulties may demonstrate indifference, problems getting started on assignments, and/or problems maintaining effort on tasks for more than a few minutes. They may also have problems with recalling information after any interference, be unable to inhibit socially inappropriate behavior, and have difficulties estimating time or sequencing activities to accomplish even seemingly simple goals such as arriving for class on time. Because they sometimes have trouble controlling or modulating emotion, they may respond catastrophically to any criticism or attempt to intervene helpfully, crying uncontrollably, laughing or being silly, or exploding angrily. All of these behaviors should be met calmly and with clear, simple statements designed to redirect the student positively.

The following general guidelines may be helpful:

1. **Reduce choices to a minimum.** Do not present options to appropriate activities. Students with executive function problems are overwhelmed by multiple options. They tend to get caught up in irrelevant detail and cannot recognize priorities. Given two choices, even when one of them is absurd, the odds are about even that the wrong choice will be made.

2. **Avoid bargaining with students.** Contingency agreements, unless they are clearly established in writing, will generally be ineffective in motivating students.

3. **Structure and predictability are critical.** Instructors should see to it that students have schedules of daily and weekly activities, including dates when assignments are due and

examination dates. Students will need to be reminded to check these schedules periodically throughout the day.

4. Even when memory appears intact, the student amy demonstrate severe problems with functional memory and require frequent cuing to carry out activities appropriately.

5. **Use direct instruction techniques.** Direct instruction has been particularly effective in teaching basic skills and in helping students to master complex materials. When teachers explain exactly what students are expected to learn, and demonstrate the steps needed to accomplish a particular task, students learn more.

a. Set clear goals, and make sure the student understands those goals.

b. Provide assignments which lead the student step-by-step to the attainment of goals.

c. Provide clear, concise explanations and illustrations of the subject matter.

d. Ask frequent questions to see that the student understands the work.

e. Give frequent opportunities to practice what is learned.

6. **Provide study skills/organizational assistance.**

a. Space learning over time. Distribute practice according to a schedule which the student has a copy of.

b. Identify the main idea in new information. Draw associations between new information and past learning, and draw inferences about the significance (personal and general) of new information.

c. By identifying central and recurrent patterns in content areas, teachers can help students focus on important

information and not get overwhelmed by minor details.

7. **Provide positive feedback.** Students who are accustomed to failure and who have difficulty mastering skills, react more positively to encouragement and praise than to criticism. Constructive, timely feedback can reinforce and help develop positive self-esteem. Students who believe they can succeed are usually more successful.

Educators must understand that executive function problems are persistent and reduction of symptoms usually indicates successful accommodation rather than remediation of problems. For this reason, generalization and carry over may be highly unreliable, and symptoms which appear to resolve will generally recur after changes in the environment or environmental demands.

Disturbances of Attention Processes

To most educators, attention and attentive behavior are synonymous concepts. In the classroom, physical restlessness, yawning, playing with objects or materials inappropriately, looking at other children, and staring blankly into space are viewed as frank indicators of inattentive behavior. More disruptive behaviors include slipping from ones seat, crawling under desks, touching or talking to other children, and making noises during classroom presentations, discussions, or during periods of work on assigned projects. Such behaviors are so characteristic of inattention that they constituted one of the primary diagnostic sub-components in the 1982 definition of Attention Deficit Disorder described in the **DSM-III (Diagnostic and Statistical Manual, 3rd edition)** published by the American Psychiatric Association.

But inattentive behaviors are not necessarily inattention. Most un-injured children can successfully divide their attention between objects of play and the activities going on around them, and most can also appear attentive to information around them while they are preoccupied with thoughts or worries which are wholly irrelevant. Preoccupation is rarely attended by excessive activity. These examples illustrate the complex nature of normal attention. The essential differences between the attention of un-injured and injured children lies in the persistence and pervasiveness of attention disturbances. Injured children often cannot bring their attention under control at will without extreme effort. Even then, they tend to be readily distracted and performances are interrupted.

There appears to be an attentional timetable which follows recovery from injury. Sohlberg and Mateer (1986) have characterized this in terms of a hierarchical model which has at its base the ability to focus on any external information (**focused attention**), then progresses through the ability to sustain effort (**sustained attention**), select relevant from irrelevant information (**selective attention**), alternate attention from one task activity to another (**alternating attention**), and finally to divide attention from one task to another (**divided attention**). Disturbances, even relatively mild disturbances, in any one of these components may result in compromise of the ability to process information with adequate efficiency to acquire and organize information presented in formal educational settings.

Disturbances of Memory Processes

Over the many years memory has been studied, a number of different kinds of memory have been described. Some of the terms used to describe various functions of memory overlap with other terms. They also overlap with non-memory functions such as attention. Nevertheless, many of the terms which are used to describe memory continue to be used because they continue to have conceptual utility--they are useful in describing the healthy and pathological function of memory.

Among the most frequently used descriptors are short-term and long-term memory. **Short-term memory (STM)** is time-limited memory; often it is a term used to describe the length of time information can be held in mind just long enough to repeat it back intact. The short-term system is also limited in terms of the quantity of information it can hold. In adults the amount of information is considered to be seven bits of information (random numbers, objects, words, or letters) plus or minus two bits. In other words, the average adult should be able to recall five to nine random digits read aloud to him or her just after hearing them. Children show a developmental gradient in the capacity to recall random numbers, with younger children demonstrating the ability to recall few numbers and older children approaching the adult level. This developmental phenomenon has resulted in the incorporation of digit recall into standardized tests of intelligence (IQ measures) and tests of cognitive development. The reliability of the phenomenon has contributed to the belief that the short-term memory has reality.

Long-term memory (LTM) is that memory which does not seem to be time-limited. It is the memory which is associated with acquired skills and knowledge, with stored information. Processes which are used to describe the function of long-term memory include acquisition, organization, storage, and retrieval.

Over the past few decades, a number of different kinds of memory have been discovered to exist. Most of these complicate a notion of LTM as a unitary system. **Semantic memory** involves the ability to make known what we know. When asked, we can verbalize our knowledge: "The capital of the United States is Washington D.C." Semantic memory also involves our own awareness of what we know; to know what we know. Semantic memory is at work when we say "yes" with confidence to the question, "Do you remember what you had for dinner yesterday?".

Procedural memory is a skill-related memory. Often called "rule-based", procedural memory allows us to learn and utilize sequences of action to accomplish tasks. The mathematical operations of addition, subtraction, multiplication, and particularly division are illustrative of procedural memory. Long division requires the operations of multiplication and subtraction in very precise steps in order to arrive at a correct answer.

Prospective memory involves remembering to remember. It is a concept which comes closest to metamemory (see below). Prospective memory allows us to postpone actions until a later time. This memory also operates when we fulfill our promise to do something we said we would do in the future. Prospective memory is the memory of daily schedules, appointments, and time-governed routines (remembering to take medication).

Immediate memory, recent memory, remote memory are overlapping terms which, depending upon the person who uses them and the situation in which they are used, are often synonymous with STM and LTM, but which sometimes slop over from one concept to the other. For example, Immediate recall and recall from STM are usually understood to be time-limited. Recent memory, however, may refer to information just heard or information heard hours before. Remote memory may refer to information from years past or information from the day before.

As might be expected, some kinds of memory seem to be more resistent to disruption following brain injury than other kinds. Immediate, short-term, and prospective memory are particularly fragile and virtually always show disturbance just after injury. Long-term, remote, and procedural memory appear to be the most resistent to disruption.

Amnesia usually refers to some pathology of memory. Initially, amnesia appears to be pervasive, affecting the child's ability to remember familiar information, as well as new information. The inability to remember events which occurred prior to the brain injury is called **retrograde amnesia**. Inability to remember events after the injury is **anterograde amnesia**. A special kind of amnesia characterized by the inability to remember events of the injury itself and events immediately following the injury is **post-traumatic amnesia (PTA)**.

Metamemory & Working Memory

Metamemory refers to the individual's understanding of the conditions and processes necessary to remember certain information presented under certain conditions. Metamemory involves recognizing the nature of material to be remembered, how it is likely to be used, and choosing a memory strategy which is appropriate to both material and use. For example, a rote learning strategy may be an appropriate way to learn a list of facts or dates for a quiz; while rote learning may not be at all appropriate for learning information which must be applied to solve a problem involving social skills.

Metacognitive skills, including metamemory, demonstrate a developmental pattern which is similar in many respects to that seen in general cognitive development. Of particular interest is the fact that young children who receive practice in the use of the metamemory techniques and strategies of older children, while showing immediate advantages in remembering information, do not appear to generalize or carry over metamemory skills until these skills would normally develop (Kail, 1979). In other words, young children may be trained to remember like older children, but they do not seem able to utilize that training outside of the situation in which it was practiced. This is of interest because children who sustain traumatic brain injury sometimes appear to lose the metacognitive skills necessary to generalize training from a practiced activity to applied use of the training in a practical situation.

Working memory is a concept proposed by Alan Baddely (1986). The concept attempts to deal with the complexity of memory function by positing a temporary storage for information which is being processed during work on a cognitive task. The working memory is limited in capacity and includes a "central executive" which directs attention, supervises the retrieval and process of stored information, and directs activities appropriate to the task at hand. Working memory efficiency increases when tasks involve well-practiced activities or when the tasks themselves are familiar. Efficiency decreases when tasks are novel and when task-relevant activities are unfamiliar. In such cases, conscious analysis, sorting of information into categories, and planning, activating, and monitoring operations and procedures necessary to goal accomplishment must take place. The concept of working memory would explain the slow, plodding nature of beginning reading where much of the capacity of working memory is occupied by sound-by-sound decoding, usually at the expense of comprehension. And beginning writers who focus on the content of their message often "forget' to correctly punctuate and capitalize or commit grammatical errors because they cannot manage in working memory all of the activities required of writing until some fundamental activities become "automatic."

Predictably, when a child is injured, and many previously automatic activities require conscious effort, working memory suddenly becomes overloaded with the "mundane" processes associated with daily survival. An overloaded working memory does not process anything adequately, and logically, those functions necessary to the survival of the child crowd the limited capacity of the working memory. Unused to having to prioritize and consciously manage such activities as eye-opening, visual scanning of the environment. recognizing the edible from the inedible, reaching for persons or objects with accuracy, and so on, the child is overwhelmed by problems of information management and responses become confused and expressed in primitive ways (anger, fear, etc.). In comparative terms, the system becomes burdened with "priorities" and rapidly "crashes" like an overloaded computer.

Residual memory deficits usually involve prospective memory and new learning. These residuals are difficult to understand since immediate recall (STM) may appear to recover completely, and old (preinjury) memories may seem to recover sufficiently to allow a child to recognize people from the past and to remember "milestone" experiences with little or no prompting. In addition, well-learned skills such as reading, handwriting, and arithmetic operations may seem to recover quickly.

Often, memory residuals are not recognized until new learning is taxed in the classroom with the introduction of new materials, new information, and new procedures. Such problems become evident too when achievement is measured over time and a child begins to show apparent loss of academic ground on group test measures or on standardized tests of individual achievement. Under these circumstances the child's ranking in terms of percentile scores will show "slippage," but grade-equivalent scores may remain static.

SCHOOL RE-ENTRY RECOMMENDATIONS

Return to school following traumatic brain injury (TBI) is a complicated process at best. Children experience problems with adjustment to differences in ability which compromise processing or production efficiency. Frustration is high under such circumstances, while toleration for frustration is reduced by limited stamina, anxiety over return to cognitive and social demands of a competitive environment, and worry over imperfect understanding of deficits and untested, newly learned compensatory techniques. These conditions make the transition from hospital to school an ordeal for any injured child. In the best of situations, the child adjusts to changes and the outcomes are surprisingly positive.

The following recommendations have been found to be particularly supportive of a child's reintegration into the school community.

1. **Establishment of a school team.** Ideally, this team will mirror a hospital-based rehabilitation team, with representatives of disciplines from physical, occupational, and speech therapies, as well as teachers from the fields of regular and special education, and representatives of school social work, school nursing, school psychology, and administration.

2. **A case manager should be selected** from among the team constituents. This person should have daily contact with the child, and be able to monitor progress on a day-by-day basis. A case management approach has been in use by Tacoma Public Schools since 1987. Information about this approach, including formal information gathering techniques, may be obtained by contacting Carol Barnett, Head Injury Team Case Manager, Henry Foss High School, 2112 S. Tyler, Tacoma, Washington 98405 (Phone: (206) 596-2300, ext. 3548).

3. The case manager should be responsible for keeping the team informed of the child's changing and emerging needs, as well as for contacting individual team members as necessary when questions and concerns arise. The case manager should also be the primary contact person for the child's family, the hospital team, and others involved in the child's care.

Descriptive Words & Phrases to Avoid

When preparing to work with traumatically brain injured children, educators need to be made aware that many terms used to describe learning behaviors are inappropriate, either because they imply volition or because they imply psychopathology. In both cases, behavioral difficulties are presumed to have basis in the child's psychological response to the normal demands of his or her environment; demands another child would be able to deal with without developing maladaptive behaviors. But children who have sustained brain injury do not experience normal environmental demands. To the brain injured child, all demands may be extreme and even the seemingly easiest task may be overwhelming. For these reasons, the following words and phrases should be avoided when describing the behavior of TBI youngsters:

lack of motivation
apathetic
sloppy, careless
good or bad citizenship
dependent behavior
misbehavior
acting out
out of control
good or poor study habits
any computer generated statement

Traumatic Brain Injury
&
The School Psychologist

The school psychologist functions primarily as an interpreter for the child, the team, for other educators, and for parents. By assessing the child's cognitive functional efficiency, the school psychologist can help the child understand why previously easy tasks may be so difficult and frustrating. The psychologist can also give team members, other educators, and parents insights into a child's current cognitive abilities, levels of deficit awareness, and the ability to tolerate frustration and manage his or her own behavior. Suggestions for material/task and environmental accommodations can enhance the success of those working with the child. Behavior plans can reduce the stress inherent in working and living with a chronically ill child. Finally, the school psychologist can monitor progress and generalization of training.

ASSESSMENT OF HEAD INJURED CHILDREN

The tools of the school psychologist are particularly well suited to assess the needs of head injured children. Among the most important of these are observation and information gathering. Standardized tests are an important part of the latter, but results must be interpreted against a background of adequate information which includes pre-injury history, history of the injury (including medical findings), and in-class, at-home, and test session behavior.

The purposes of assessment should be kept in mind: to provide objective baseline data, to identify areas of strength and weakness, to provide team members with meaningful treatment information, to monitor the progress of recovery.

Specific questions that need to be answered include:

Can the child establish and sustain adequate attention to listen and participate in a mainstream classroom? If not, what does the child need to facilitate attention? Cuing? Redirection? One-one aide?

Are the child's self-management skills adequate to allow him/her to maintain appropriate behavior in a mainstream setting? Can he/she manage distraction? Inhibit vocal disruptions? Inhibit touching others? Manage restlessness, frustration, anxiousness, anger?

Are the child's language skills adequate to comprehend verbal information in a mainstream setting? If not, what assistance might facilitate communication?

Test Selection

Ideally, a battery of tests would include measures which would provide maximum information about specific areas of cognitive function in a brief period of time. Test selection should appreciate the fact that children who have sustained head injury typically fatigue easily, may have difficulty sustaining effort, and may not manage frustration well.

The following assessment model, suggested by Murial Lezak (1983), has been found to have both clinical and research utility. The model identifies areas of cognitive function which are believed especially pertinent to school performance, including **intellectual function, executive function, attention & concentration, memory & learning, verbal abilities, visuospatial abilities,** and **academic development.**

Representative measures familiar to school psychologists are grouped below according to their respective categories. The **Wechsler Scale** subtests should be selected from the most recent revisions (**WAIS-R, WISC-R/WISC III**). With judicious selection, a test battery suitable for children from 2.5 years to 18+ years may be constructed and administered in 60 to 120 minutes, depending upon the age and capabilities of the child. Combined with observations and an understanding of executive function processes, memory processes, and behaviors reflecting attention processes (see above), obtained test data can provide educators with important information and understanding of a child's probable learning strengths and weaknesses. The school psychologist should keep in mind, however, that some critical cognitive functions, particularly executive function processes are especially elusive and may not be adequately described by performance on standardized tests (Miller, 1993; Mateer & Williams, 1991).

Intellectual *

Wechsler Scale (WISC,WAIS short forms)

Vocabulary & Block Design (Sattler, 1988)

Similarities, Arithmetic, Picture Completion, Digit Symbol (Kaufman, 1990)

Kaufman Assessment Battery for Children (K-ABC)
Triangles, Matrix Analogies, Riddles

Stanford-Binet Intelligence Scale--Fourth Edition (SB-4)
Vocabulary, Absurdities, Pattern Analysis

Kaufman Brief Intelligence Test (K-BIT)

Kaufman Adolescent & Adult Intelligence Scale (KAIT)
Definitions & Logical Steps

Executive Function

KAIT Logical Steps & Mystery Codes

Verbal Fluency (Animal Naming, FAS--Spreen & Strauss, 1991)

Attention & Concentration

K-ABC Hand Movements, Number Recall

Wechsler Scale Digit Span, Coding/Digit Symbol

SB-4 Bead Memory, Memory for Digits, Memory for Objects

Memory

Wide Range Assessment of Memory & Learning (WRAML)
Picture Memory, Design Memory
Story Memory, Sentence Memory
Verbal Learning, Visual Learning

Rey Auditory-Verbal Learning Tests (AVLT)--Spreen & Strauss, 1991; Lezak, 1983)

Verbal

KAIT Auditory Comprehension

WIAT Listening Comprehension

WISC/WAIS Vocabulary

SB-4 Vocabulary, Memory for Sentences

K-BIT Vocabulary

K-ABC Riddles

Visuospatial

WISC/WAIS Block Design, Object Assembly

SB-4 Pattern Analysis, Copying, Paper Folding & Cutting

K-ABC Triangles, Matrix Analogies

K-BIT Matrices

Academic

Wechsler Individual Achievement Test (WIAT)
Screener Subtests & Reading Comprehension, Numerical Operations

Kaufman Test of Educational Achievement (K-TEA)
Brief Form

* Working estimates of intellectual function based on short forms may be obtained by summing the subtest scaled scores and dividing by the number of subtests administered. Scaled score averages of 7 and above should be considered within the average range, indicating normal range intellectual function. Additional useful formal and informal clinical measures, including thorough descriptions, administration instructions, and normative data, are available in the Lezak and Spreen & Strauss texts listed below.

Testing should be conducted periodically: on arrival at, or transfer to the school; after 60 days (if the child returns to school from the hospital); annually for the first 3 years after the injury; at major transition points, thereafter, for the purposes of appropriate curriculum/placement planning (entrance into middle school or high school, prior to high school graduation). Testing should also be done if team members, teachers, or parents report functional/behavioral deterioration. Typically, test results should show improvement over time. Test score declines in the presence of functional/behavioral deterioration may reflect emergence of serious physical or emotional/adjustment problems. Such a situation would warrant referral to medical specialists.

MANAGING BEHAVIOR PROBLEMS IN THE CLASSROOM

The management of behavior problems will be more successful if the child's inappropriate behavior is viewed as behavior which is not under the child's control. The task of the behavior manager, then, is to provide the child with the means to gain control of behavioral acts. The child should be given brief, clear, simple statements which will direct appropriate behavior. Directive statements should be delivered quietly in a calm, matter-of-fact voice. Gestures and demonstration may accompany verbal direction. In some situations, physical guidance (gentle movements of the child's hands, or removal of hands from material; gentle guiding touches; holding the child's hands to prevent reaching) may be most effective.

Children with impaired memory or difficulties generalizing learning will require repeated management interventions.

Agitated Behavior

Agitated behavior is marked by increased restless movement, increased vocal volume, and increased distractibility. Swearing, spitting, kicking, biting, hitting, running away, or tantrum-like behavior may occur after a period of extreme agitation. Agitation is commonly seen when a child is fatigued or over-stimulated. It is most common during the initial days after return to school, but may occur at any time in situations where social and cognitive stimulation is intense. **Children who are agitated are capable of impulsive acts which put themselves and others at risk for injury.**

Agitation may best be managed by decreasing external stimulation. This may be done by backing off and letting the child sit quietly, or by moving the child to some quieter place, either within the classroom or outside. Agitation management efforts should be done dispassionately, without an attitude of punishment.

Additional ways of managing the behavior of an easily agitated child include: reducing choices to a minimum (2 or 3), avoiding bargaining, and providing the child with structured situations and predictable routines. The child should be allowed time to process information, and to prepare for shifts from one activity to another. Changes in routine should be clearly explained well in advance of their occurance.

Inappropriate Sexual Behavior

Sexual curiosity and sexually implicit behavior is normal in adolescents. The sexual preoccupation and sexually explicit

behavior sometimes seen in adolescents following TBI is usually a consequence of normal tendencies combined with an inability to inhibit curiosity and natural urges. Inappropriate behaviors may be dealt with by reminding the student of the inappropriateness of such behavior and by re-directing his or her attention to some other more acceptable activity. Verbal reminders should be brief: "We do not behave this way." "We do not say such things." "That is inappropriate." **Lengthy explanations should not be undertaken.** Removal of the student from the company of those who stimulate sexual behavior may be temporarily effective, and may allow the student a chance to re-gain self-control.

Peer confrontation, where other students tell the child that his or her behavior makes them feel uncomfortable, has been very effective with some children. Such a confrontation should be supervised by an adult to assure avoidance of scolding or blaming.

Defiance and Non-Compliance

Overt defiance and refusal will often attend confrontation in the company of peers. This should be avoided. Discipline or correction should be done in a quiet area away from others. Provision for removal from the classroom and isolation until the student agrees to behave may be effective. A clear contingency contract may be helpful. Students often refuse to work on tasks which will reveal or stress their weaknesses. Catastrophic reactions to such situations may be reduced by limiting such work and by gradually increasing the difficulty level of tasks over a period of time. Educators should keep in mind that **when catastrophic response occurs, the student is not learning;** redirection to another task or to some aspect of the task where the child may experience success will probably result in more compliant behavior. "Reasoning with the child" will probably be ineffective.

MANAGING COGNITIVE DISTURBANCES IN THE CLASSROOM

Educators who work directly with students who have sustained TBI should remember that a child's working memory capacity will be limited by his or her need to exert conscious effort to accomplish tasks which had previously been automatic or near automatic. For this reason, virtually any activity which will exercise skills until they become automatic will be of benefit to the child, since that will free up space in working memory. Repetitive exercises should be introduced by reminding the child that when an activity is mastered, he or she will not have to think about doing it. Likening cognitive exercises to physical work-outs may be helpful. Some children respond positively to terms like "brain training" or "brain workouts".

Facilitating Attention & Concentration

Seating the student near the teacher may help avoid distraction by other students, as well as focus attention on the center of teaching activity.

Directive statements such as, "Now we're going to turn to a different subject. Put your science books away and take out your math books," will help the student make the transition from one activity to another. In addition, it will help the student establish an appropriate attentional set.

Having the student repeat instructions prior to activity may be beneficial. However, because of the frequent tendency for students to lose track of the focus of their own activity once they begin work, a written checklist which outlines the goals of work and details steps to completion may be far more helpful. Checklists for routine activities such as spelling practice or long division procedures may be sealed in plastic and kept in a notebook or in a small file box on the student's desk. Checklists for new activities may be provided by the instructor or an aide, or the student might generate a quick outline of steps with teacher or aide assistance.

With an available checklist, the teacher or aide may interrupt obvious nonproductive activity such as day-dreaming or playing with materials by tapping the checklist or pointing to it from a distance.

Severe attention deficits may require medical management. This may take the form of adjustment of dosages of anti-seizure medication, or trial on one of the drugs which has been found to enhance attention (Ritalin, Cylert, etc.). The pharmacologic management of attention deficits should always take a multi-disciplinary approach (physician, parent, teacher, school nurse, school psychologist). This is particularly true where traumatic brain injury is concerned because drug effects are not predictable and may contribute to further disturbances of processing efficiency by compromising delicate or marginally intact systems.

Contingency-reward systems associated with behavior modification can often increase interest in tasks and task completion. Educators should keep in mind, however, that individuals with memory disorders may forget the terms of the contingency agreement. For this reason, simple and immediate rewards are best, as opposed to promises of delayed pay-offs for sustained effort. Social rewards (smiles, "Good Work") should be combined with some tangible recognition of the student's attention to the task at hand and productive efforts (gold stars, stickers, a plus or check mark which may be traded for some desired object or privilege). Cost-response systems (ie, loss of tokens or loss of privileges for inattentive behaviors) are inappropriate for students who are unable to remember.

Management of Organizational Deficits

Compensatory Systems
&
Accommodative Techniques

Providing the student with a formal or informal system of information gathering may be particularly beneficial. Thomas Staton's **PQRST** technique is an easy to learn method for reading and listening which, while it may not enhance retention of information in cases of severe amnesia, will aid in many cases where memory is influenced by deficits of acquisition and retrieval. The technique reminds the student to **Preview** information to be learned or read, formulate a series of personally meaningful **Questions** based on the preview, **Read** (or listen) to answer questions), **State** or paraphrase information read or heard, and **Test** understanding of material. Staton's approach is described in detail in a booklet available through American Guidance Services (AGS), Circle Pines, Minnesota (phone: 1-800-328-2560). Other organizational learning strategies may be found in study skills texts.

Teachers may help the student organize information presented in class by writing a series of key points to be covered (advance organizers) on the chalkboard at the beginning of the presentation. The student should understand that by copying the key points and listening for them, he or she will be more likely to get the important parts of the presentation.

Organization can be facilitated by use of subject notebooks or multiple subject binders with sections for each content area. Subdivisions should begin with a brief description of the course and course content, and include assignment due dates, daily work records, and daily notes highlighting information newly presented. This kind of "memory book" may be the student's only record of having been in a classroom on a specific date. Such a system will allow teachers, aides, parents, and others involved in the student's education to assist in repeated review of information.

More accommodative organization aids would include providing students with outlines of daily lectures or classroom presentations; encouraging the student to share classroom notes with a competent student or providing a note-taker; or providing opportunity for direct organization of student work and assignments through daily contact with a special educator (usually at the beginning and end of each school day).

Self-organization of information may be fostered by teaching outlining techniques, the use of relational diagrams (ie, "spider diagrams" which visually link new ideas to well-learned information), and other categorization strategies.

Tests which involve recognition (multiple choice, true-false, matching) provide the student with greater structure and context cues than tests which involve recall (essay, specific single word written response). Recognition questions allow more equitable probing of the student's understanding of course content.

Considerations in the Treatment and Management of Memory Deficits

Educators need to keep in mind that memory disturbances are often permanent in nature, and if not permanent, then highly resistent to remediation. For these reasons, all memory training and training in the proper use of compensatory and accommodative systems will require long-term commitment. The best system may not be spontaneously used by the student without reminders or cues, even after days, weeks, months, or years of training and practiced use.

Management of memory disturbances will more likely meet with success if the following things are kept in mind:

As previously noted, memory disturbances following traumatic brain injury are highly resistent to remediation. Spontaneous resolution of impairment usually occurs during the first months following injury, and TBI survivors are often left with life-long, highly debilitating memory problems.

Repeated practice of memory exercises usually does not result in general improvement of memory (Wilson, 1987). For example, practicing number sequences, lists of words, or doing computer-based memory tasks may not be of practical benefit to the student. Although task-specific gains may be intrinsically rewarding, they have not been found to be reliably associated with improvement in functional memory or in improved classroom learning.

Students should recognize the need for use of memory system management activities. This may be difficult since the child may forget that a problem with memory exists. In addition, if a compensatory system works relatively efficiently, the magnitude of memory problems might be forgotten. Written contracts, periodic self-testing techniques, and formal objective testing of memory skills may be helpful in re-establishing dedication to the use of compensatory systems.

The persistent nature of memory deficits is intensely frustrating and stressful. TBI-related memory disturbances frequently result in emotional disturbances which require ongoing informal supportive counselling and may require periodic formal psychosocial interventions.

The stress associated with a student's memory deficits is not limited to the student. At-home caregivers, as well as school-based personnel share in the student's frustration and distress at limitations and obstacles to achievement. In addition, such students require inordinate vigilance to keep them from being harmed by forgetting to monitor for situational safety, vigilance which is often met by resistance and anger by persons who wish to be independent of supervision. The resentment and active resistance on the part of memory-impaired students can rapidly erode the coping reserves of those in supervisory roles. For this reason, parents and educators will benefit from supportive networking and from the availability of counselling services provided by professionals who understand the needs of caregivers.

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